ALGEBRA.

81. Show that $\frac{{a_1}^r}{(a_1-a_2)(a_1-a_3)(a_1-a_4)\ldots(a_1-a_n)}$

$+\frac{{a_2}^r}{(a_2-a_1)(a_2-a_3)\ldots(a_2-a_n)}+\ldots\ldots\frac{{a_n}^r}{(a_n-a_1)(a_n-a_2)\ldots(a_n-a_{n-1})}$

is zero if r is less than $n-1$; to 1 if $r=n-1$, and to $a_1+a_2+_3+\ldots a_n$ if $r=n$.

[*C. Smith's Treatise on Algebra.*]

82. $\left.\begin{array}{l} y^2+yz+z^2=a^2 \\ z^2+zx+x^2=b^2 \\ x^2+xy+y^2=c^2 \end{array}\right\}$ find x, y, and z.

[*Ibid.*]

GEOMETRY.

83. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

θ being variable, find the locus of a point whose coördinates are

$$a\tan(\theta+\alpha), \quad b\tan(\theta+\beta).$$

84. Proposed by FREDERICK R. HONEY, Ph. B., New Haven, Conn.

Find the locus of a point which will trisect all arcs having a common chord.

85. Proposed by S. F. NORRIS, Professor of Astronomy and Mathematics, Baltimore City College, Baltimore, Md.

Prove by pure geometry. Give direct proof, if possible.

If the bisectors of two angles of a triangle are equal, the triangle is ososceles.

[From *Wentworth's Plane Geometry*, exercise 43, page 72.]

MECHANICS.

61. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

A body is suspended from a fixed point by an elastic string, which is stretched to double its natural length when the body is in equilibrium. Find how much the body must be depressed, so that when let go, it may just reach the point of suspension.

62. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

A particle of mass m moves in the circumference of an ellipse with constant rate v. It is constrained to move in that circumference by attractive forces in the two foci. To determine the magnitude of these forces.

DIOPHANTINE ANALYSIS.

58. Proposed by E. S. LOOMIS, Ph. D., Professor of Mathematics in Cleveland West High School, Berea, O.

"The base of a right-angled triangle is 105; find all the perpendiculars and hypotenuses to fit it, such that their values shall be integers."

59. Proposed by G. B. M. ZERR, A. M., Ph. D., President and Professor of Mathematics in Russell College, Lebanon, Va.

Find the sum of the mth powers of all the numbers less than P and prime to it, and then by substitution find the sume when $m=1, 2, 3, 4, 5$.